REMARKS/ARGUMENTS

Claims 1-7 and 15 are pending herein. Claims 8-14 have been cancelled without prejudice or disclaimer. New claim 15 has been added hereby as supported throughout the specification. Applicant respectfully submits that no new matter has been added.

1. Applicant hereby affirms the provisional election to prosecute claims 1-7 in the present application. The non-elected claims have been cancelled without prejudice or disclaimer. Applicant presently intends to file a divisional application for the non-elected claims, and thus reserves the right under 35 USC §121.

2. The Examiner's objection to the disclosure is noted, but deemed moot in view of the substitute specification filed herewith.

3. Claims 1, 2 and 4-6 were rejected under §102(e) over Fukui et al. U.S. Patent Application Publication No. 2001/0025209. This rejection is respectfully traversed.

Pending claim 1 recites a method for running an electric storage system which is set up *at an electric energy consumer* (i.e., an end-user). Fukui does not teach a method for running an electric energy storage system which is set up at an electric energy consumer, as the PTO argued. Fig.1 of Fukui shows an electric power supply control system set up at a single distribution facility, wherein one community power pool is provided which controls the power distributed to a ***plurality*** of individual consumers. This is clearly stated throughout the specification of Fukui. Paragraph [0045], for example, which was also referred to by the PTO, discloses an electric power storage apparatus where electric power is transmitted to the customers 103a-103m, indicating a plurality of customers connected to a single distribution facility where power supply is controlled.

The electric power supply control system of Fukui, therefore, is a centrally located distribution system for a plurality of electric energy consumers, and is not set

up at the individual consumers *per se*. The only portion of the electric power supply control system of Fukui located at the electric energy consumer is a measuring apparatus, which by no means meets the limitations of pending claim 1.

In addition to the above, the presently claimed method (i.e., claim 6) controls the overall cost of the electric power by utilization of the energy storage device. More electric energy is purchased during low demand when the cost of the electric energy is lower to charge the storage device. The electric energy stored in the storage device is discharged during high demand to reduce the amount of energy purchased by the consumer when the cost of the electric energy is higher. In this way, the total electric fee for a single consumer is reduced.

To the contrary, Fukui discloses a system wherein the electric power supply control system monitors energy costs and purchases power from any one of a plurality of power suppliers based on price. Power distributed to consumers from the community power pool is varied to achieve load leveling and reduce the amount of purchased power.

For at least the foregoing reasons, Applicant respectfully submits that claims 1, 2 and 4-6 define patentable subject matter over Fukui, and thus, are in condition for allowance.

4. Claim 3 was rejected under §103(a) over Fukui. Claim 7 was rejected under §103(a) over Fukui and further in view of Suzuki et al. U.S. Patent No. 6,487,508. The Examiner argued that it would have been obvious to a skilled artisan to make the consumption rate of the energy stored in the electric energy storage system 80% or more to reduce the electric power required from the electric energy supplier. However, the 80% requirement recited in claim 3 is directly related to the use of the sodium sulfur battery recited in claim 7. The sodium sulfur battery is a high-temperature device that requires heat to properly operate. An 80% consumption rate of the energy stored in the electric energy storage system creates sufficient heat to maintain the temperature of the battery to that required for proper operation. If the

electric storage system is operated at less than an 80% consumption rate, the effectiveness of the sodium sulfur battery and, therefore, the electric energy storage system as a whole, decreases.

Fig. 2 shows the results when the electric energy storage system of the present invention is operated in excess of 80% (91.4%). The electric energy demand was reduced from 1600 kW to 1000 kW. Figs. 9 and 10 show the results when an electric energy storage system is operated at 63.1% and 45.4%, respectively. As can be seen, the electric energy storage system becomes less effective at consumption rates less than 80%. The electric energy demand was reduced only from 1600 kW to 1100 kW in Fig. 9 and only from 1600 kW to 1200 kW in Fig. 10. Therefore, the 80% consumption recited in claim 3 is a direct result of the use of the sodium sulfur battery recited in claim 7 and provides for more efficient operation of the electric energy storage system.

For at least the foregoing reasons, Applicant respectfully submits that this application is in condition for allowance. Accordingly, the Examiner is requested to issue a Notice of Allowance as soon as possible.

If the Examiner believes that contact with Applicants' attorney would be advantageous toward the disposition of this case, the Examiner is herein requested to call Applicants' attorney at the phone number noted below.

The Commissioner is hereby authorized to charge any additional fees associated with this communication or credit any overpayment to Deposit Account No. 50-1446.

Respectfully submitted,

12/16/03
Date

Stephen P. Burr
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SPB/SEC/gmh

Attachments: Appendix A - substitute specification
Appendix B - marked-up specification

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Title of the Invention

Method for Running Electric Energy Storage System

Background of the Invention and Related Art Statement

[0001] The present invention relates to a method for effectively running an electric energy storage system, e.g. a secondary battery, which is set up at an electric energy consumer and capable of controlling an electric energy to be purchased by the electric energy consumer by controlling charge and discharge.

[0002] A demand for electric energy has recently been increasing to a great extent in accordance with the development in domestic electrification, the spread of the personal computer, etc. On the other hand, increase in gross output of electric energy has ~~become dull~~slowed because of a request that a global warming phenomenon due to carbon dioxide discharged from a thermoelectric power plant is suppressed~~, etc~~. In addition, effective running of electric energy equipment and reduction in an investment in equipment for power transmission and power supply as well as load-leveling of electric energy has strongly been required.

From the above background, various electric energy storage systems have been proposed, and a sodium sulfur battery (hereinbelow referred to as a NAS battery) is a typical one.

[0003] It is natural that an actual electric energy consumption by an electric energy consumer should change momentarily depending on a power

load of equipment and a pattern for living of the electric energy consumer.

Typical changes on standing in electric energy consumption in an office building are shown in Table 1 and Fig. 6.

[0004]

Table 1

[Electric energy consumption in an office building (unit: kWh/h)]

	May (weekday)	July (weekday)	July (Sunday)	January (weekday)
1 – 2 o'clock	163	249	241	227
2 – 3 o'clock	140	238	240	204
3 – 4 o'clock	140	235	235	201
4 – 5 o'clock	135	231	230	185
5 – 6 o'clock	130	231	232	198
6 – 7 o'clock	133	228	235	208
7 – 8 o'clock	135	235	232	214
8 – 9 o'clock	173	312	235	356
9 – 10 o'clock	798	924	240	1003
10 – 11 o'clock	1008	1355	235	1393
11 – 12 o'clock	1005	1526	238	1395
12 – 13 o'clock	1002	1446	237	1322
13 – 14 o'clock	999	1460	232	1334
14 – 15 o'clock	1005	1442	238	1318
15 – 16 o'clock	1029	1460	234	1334
16 – 17 o'clock	993	1376	235	1258
17 – 18 o'clock	996	1362	241	1245
18 – 19 o'clock	672	896	228	819
19 – 20 o'clock	384	508	230	464
20 – 21 o'clock	345	385	228	352
21 – 22 o'clock	265	350	233	300
22 – 23 o'clock	205	308	232	264
23 – 24 o'clock	173	270	231	231
0 – 1 o'clock	158	256	235	219
Total	12184	17276	5627	16045
Max.	1029	1526	241	1395
Min.	130	228	228	185

[0005] Since almost no one stays in this building in the nighttime, electric energy consumption at night is less in comparison with daytime. In addition, since a cooling load increases in daytime in summer, electric energy consumption sharply increases particularly in daytime in summer. In winter, since a heating load increases similarly, electric energy consumption in daytime increases. Further, since almost no one stays in the office on Saturday, Sunday, national holidays, or during the end and the beginning of the year, or the like, electric energy consumption is as little as in nighttime of a weekday all day long.

[0006] Changes on standing in electric energy consumption in a tap water-supplying establishment are shown in Table 2 and Fig. 7.

[0007]

Table 2

[Electric energy consumption
in a tap water-supplying establishment (unit: kWh/h)]

	May (weekday)	July (weekday)	July (Sunday)	January (weekday)
1 – 2 o'clock	482	560	523	423
2 – 3 o'clock	367	456	434	325
3 – 4 o'clock	294	352	323	250
4 – 5 o'clock	294	352	323	225
5 – 6 o'clock	294	352	323	235
6 – 7 o'clock	334	401	368	300
7 – 8 o'clock	810	972	891	650
8 – 9 o'clock	1104	1325	1214	1075
9 – 10 o'clock	1286	1543	1415	1125
10 – 11 o'clock	1053	1264	1158	941
11 – 12 o'clock	861	1033	947	767
12 – 13 o'clock	729	948	838	645
13 – 14 o'clock	638	766	702	525
14 – 15 o'clock	638	766	702	465
15 – 16 o'clock	618	741	679	451
16 – 17 o'clock	577	693	635	512
17 – 18 o'clock	600	668	613	556
18 – 19 o'clock	712	829	734	678
19 – 20 o'clock	867	1014	897	782
20 – 21 o'clock	928	1119	990	862
21 – 22 o'clock	910	1163	988	892
22 – 23 o'clock	835	1063	875	812
23 – 24 o'clock	671	850	734	590
0 – 1 o'clock	478	623	576	434
Total	16379	19853	17881	14520
Max.	1286	1543	1415	1125
Min.	294	352	323	225

Appendix B
VERSION WITH MARKINGS TO SHOW CHANGES MADE

[0008] The main power load in this tap water-supplying establishment is a motive power for running a water supply pump for directly supplying water to water consumers. Since water consumption increases in time zones for cooking and laundering in the morning, for cooking in the evening, and for bathing at night; an electric power for running the pump is required, and electric energy consumption in ~~the~~ these time zones increases. In addition, the electric energy consumption is relatively low in the afternoon, where water consumption is high. Further, almost no electric energy is used in the midnight time zones. With regard to a seasonal variation of electric energy consumption, electric energy consumption is relatively high in summer, and low in winter. Though electric energy consumption has a seasonal variation, there is no great difference between weekdays and holidays in one season.

[0009] As is obvious from these two examples, electric energy consumption though a year generally varies to a great extent depending on an electric energy consumer. The present situation is that an electric energy consumer selects an electric fee system from various electric fee systems arranged by an electric energy supplier, or the like, so that the electric fee may become minimum.

~~By the way, the~~The electric fee systems of an electric power company are very complex and set up in detail depending on voltage (low voltage, high voltage, particularly high voltage, etc.) supplied to an electric energy consumer, the principal power load (electric energy for business consumption in an office or the like, or electric energy for industrial consumption mainly for a motive power load in a factory or the like), and so

on.

[0010] An electric fee is generally composed of a basic fee [unit fee per kW], which determines the upper limit of consumable electric energy, and a total of monthly electric energy consumption fee [for kWh].

[0011] An example of electric fee systems arranged by an electric power company is shown below.

An electric power company arranges for various systems for an economical electric fee by load-leveling.

For example, differences in electric fee are given among seasons and time zones. The differences are hereinbelow described on reference to a list of charges in 2000 by Tokyo Electric Power Company. Table 3 shows an electric fee system arranged for high-voltage electric energy consumer with 6600 V.

[0012]

Table 3

[Charge System for High-Voltage Electricity B by Tokyo Electric Power]

Seasons classification based charge	Basic fee [¥/kW/month]	Electric energy consumption fee [¥/kWh]	
		Summer	The other seasons
High-voltage electricity B	1650	10.35	9.40
High-voltage electricity B2	1850	9.89	8.99
Remarks		June – September	October - May

Seasons and time zones classification based charge	Basic fee [¥/kW/month]	Electric energy consumption fee [¥/kWh]			
		Peak time	Daytime		Nighttime
			Summer	The other seasons	
Seasons and time zones classification based high-voltage electricity B	1650	14.75	13.30	11.95	6.15
Seasons and time zones classification based high-voltage electricity B2	1850	13.81	12.44	11.23	6.15
Remarks		13 – 16 o'clock in weekday in June – September	8 – 13 and 16 – 22 o'clock in weekday in June - September	8 – 22 o'clock in weekday in October – May	Sunday, national holiday, designated day, and 22 – 8 o'clock in weekday

[0013] An electric energy consumption fee [for kWh] in the standard charge differs in unit fee between summer (four months from June to September) and in the other seasons (from October to May). In the charge system classified by seasons and time zones, charges are set up in more detail: the peak time zone (13 – 16 o'clock), the summer daytime zone (8 – 13 o'clock and 16 – 22 o'clock), and the nighttime zone (22 – 6 o'clock) in summer; and the daytime zone (8 – 22 o'clock) and the nighttime zone (22 – 6 o'clock) in the other seasons (from October to May). A unit fee for electric energy consumption descends in the order of peak time, daytime in summer, daytime in the other seasons, and nighttime. This aims to promote load-leveling among electric energy consumers by setting up a high unit fee for electric energy consumption in a time zone having generally large electric energy consumption and a large load on equipment for generating electric energy, and a low unit fee for electric energy consumption in a nighttime zone having a small load on equipment for generating electric energy.

[0014] In addition, for an electric energy consumer having high electric energy consumption, a special charge system is arranged, in which a total electric fee is ~~cheep~~ cheap because a unit electric consumption fee is low even though a unit basic fee is high from a charge system classified by seasons and time zones. This is an example, and other electric power companies have ~~the~~ a similar charge system.

Therefore, ~~how to run~~the method of operating the electric energy storage system is important to minimize a total electric fee ~~for the situation for using a business electric source in the case that an~~where the electric

energy storage system is set up at ~~such~~ an electric consumer.

Summary of the Invention

[0015] The present invention has been made in view of the aforementioned conventional problem and aims to provide a method for running an electric energy storage system capable of minimizing a total electric fee by comparing an electric fee arranged by an electric energy supplier with the situation of an electric energy load required by an electric energy consumer in setting up an electric energy storage system at the electric energy consumer and in running the electric energy storage system.

[0016] According to the present invention, there is provided a method for running an electric energy storage system which is set up at an electric energy consumer and capable of controlling an electric energy to be purchased by the electric energy consumer by controlling charge and discharge, wherein a running pattern of charge and discharge of the electric energy storage system is previously programmed, and the running of the electric energy storage system is controlled on the basis of the previously programmed running pattern.

[0017] In a method for running an electric energy storage system according to the present invention, it is preferable that the programmed running pattern is input in a computer-control means to control the running of the electric energy storage system by the computer-control means on the basis of the programmed running pattern.

In addition, it is preferable that the running pattern is programmed so that a consumption rate of electric energy stored in the electric energy storage system becomes 80% or more. Furthermore, it is preferable that an electric fee is always optimized by observing information on purchase of electric power by the electric energy consumer with a communication means and giving instruction to correct running conditions of the electric power storage system. Based on this concept, Fig. 8 shows the concept with regard to optimization of a scale of the electric energy storage system to be set up, determination of a method of running for reducing the electric fee, correction of a method of running the electric energy storage system corresponding to unexpected consumption of electric energy, and a method of running the electric energy storage system for a long period of time.

[0018] According to the present invention, there is further provided a method for running an electric energy storage system which is set up at an electric energy consumer and capable of controlling an electric energy to be purchased by the electric energy consumer by controlling charge and discharge, comprising the steps of:

a. researching into conditions of electric energy consumption (purchased amount of electric energy) by the electric energy consumer for a predetermined period so as to be used as base data,

b. researching into an electric fee system which is arranged by an electric energy supplier and which the electric energy consumer can use and investigate an effect on an electric fee by load-leveling to select the optimum electric fee system,

c. determining a scale of the electric energy storage system to

be introduced on the basis of a date set for a contract electricity before the electric energy storage system is introduced, conditions of electric energy consumption on the day having the maximum load, a date having the highest peak of electric energy consumption, and a specification of the electric energy storage system expected to be introduced,

d. determining a running program for discharging the electric energy storage system in a time zone for high consumption of electric energy and for a high unit fee for consumed electric energy so as to reduce a purchased amount of electric energy and for charging the electric energy storage system in a time zone for a low unit fee for consumed electric energy, and

e. running the electric energy storage system on the basis of the running program.

[0019] In the above method for running an electric energy storage system, it is preferable that the running program for the electric energy storage system is input to a computer-control means to run the electric energy storage system by the computer-control means on the basis of the running program.

In addition, in the above method for running an electric energy storage system, a scale of the electric energy storage system and the running program are preferably determined so that a consumption rate of electric energy stored in the electric energy storage system becomes 80% or more. Furthermore, it is preferable an electric fee is always optimized by observing information on purchase of electric power by the electric energy

consumer with a communication means and giving instruction to correct running conditions of the electric power storage system.

[0020] In the present invention, it is preferable that a scale of the electric energy storage system to be introduced is determined so that an electric energy consumption peak is not generated by shaving the electric energy consumption peak in a time zone having the highest peak of electric energy consumption peak in a situation of electric energy consumption by the electric energy consumer by increasing an amount of consumable electric energy by discharge running of the electric energy storage system and by charge running of the electric energy storage system in the other time zone. It is also preferable that a scale of the electric energy storage system to be introduced is determined so that an electric fee is reduced by increasing a rate of electric energy purchased by the electric energy consumer in a night time zone by discharge running of the electric energy storage system in a daytime zone and charge running of the electric energy storage system in a nighttime zone.

~~Incidentally, in~~In the aforementioned method, the electric energy storage system is preferably a system using a sodium sulfur battery.

Brief Description of the Drawings

Fig. 1 is a graph showing changes in electric energy consumption before and after an electric energy storage system of rating 500kW × 7.2h is introduced into a tap water-supplying establishment.

Fig. 2 is a graph showing changes in electric energy consumption

before and after an electric energy storage system of rating 300kW × 7.2h at the consumption rate of 91.4% is introduced into a tap water-supplying establishment.

Fig. 3 is a graph showing an example of running pattern for an electric energy storage system maintaining a contract electricity of 1000kW in a summer holiday.

Fig. 4 is a graph showing an example of running pattern for an electric energy storage system maintaining a purchased electricity of 1000kW in a weekday in May.

Fig. 5 is a graph showing an example of running pattern for an electric energy storage system maintaining a purchased electricity of 1000kW in a weekday in January.

Fig. 6 is a graph showing an example of typical changes on standing in electric energy consumption in an office building.

Fig. 7 is a graph showing an example of typical changes on standing in electric energy consumption in a tap water-supplying establishment.

Fig. 8 is a chart showing a system flow from setting up to operation of an electric energy storage system.

Fig. 9 is a graph showing a running pattern in the case of operating an electric energy storage system of 300kW × 7.2h at the consumption rate of 63.1%.

Fig. 10 is a graph showing a running pattern in the case of operating an electric energy storage system of 300kW × 7.2h at the consumption rate of 45.4% is introduced into the same tap water-supplying establishment as Fig. 2.

Fig. 11 is a graph showing a running pattern in the case of operating an electric energy storage system of 600kW × 7.2h is introduced into the same tap water-supplying establishment as Fig. 2.

Detailed Description of the Invention

[0021] The present invention is hereinbelow described in more detail on the basis of embodiments. However, the present invention is by no means limited to the embodiments.

[0022] The present invention provides a method for effectively running an electric energy storage system so that a total electric fee may be minimized for using a business electric source in the case that an electric energy storage system is set up at an electric consumer.

It is necessary to optimize a combination of changes in electric energy consumption by the electric energy consumer before and after the electric energy storage system is set up and an electric fee system in order to thus plan to reduce an electric fee by setting up the electric energy storage system at an electric energy consumer.

[0023] Since an electric fee is composed of a basic fee [unit fee per kW] and a monthly electric energy consumption fee [for kWh] as described above, it is important to investigate them independently.

Optimization of a scale of an electric energy storage system ~~to be set up in view of optimizing an effect of reducing an electric fee~~ and a concept of a method for running an electric energy storage system to optimize an electric fee after being set up are hereinbelow described ~~with~~

referring to an example of the tap water-supplying establishment shown in Table 2.

[0024] Since ~~a~~ the contract electricity of the establishment is 1600kW, which is less than 2000kW, the establishment made a contract of a standard charge of high-voltage electricity B. The contract electricity is determined according to an assumed maximum electric energy consumption per hour through a year. In addition, the reason why the contract of a standard charge was chosen from various charge systems for electric fees shown in Table 3 is that electric energy consumption in a nighttime zone is relatively small and there is no advantage in employing the charge system classified by seasons and time zones.

[0025] Operation of an electric energy storage system from a viewpoint of ~~effect in~~ reducing an electric fee is based on reduction of ~~a~~ the basic fee by reducing ~~a~~ the contract electricity and reduction of ~~an~~ the electric energy consumption fee by consuming electric energy in a nighttime zone having a low unit fee for consumed electric energy to raise a nighttime rate. These can be achieved by introducing an electric energy storage system to promote load-leveling.

[0026] As barometers of the extent of load-leveling, a load rate through a year and a nighttime rate are defined as follows:

Load rate through a year =

gross electric energy consumption through a year [kWh] / (contract electricity [kW] $\times$ 365 days $\times$ 24 hours)

Nighttime rate =

electric energy consumption in nighttime zone in a contract [kWh] /

gross electric energy consumption through a year [kWh]

Therefore, for effective reduction ~~in~~ of the electric fee by introducing and setting up an electric energy storage system, it is necessary to reduce ~~a~~ the contract electricity by reducing ~~a~~ the basic fee in the first place, and it is necessary to optimize a scale for setting up ~~from this view point~~the electric energy storage system.

[0027] The first requisite for determining an adequate scale of an electric energy storage system to be introduced is to make the scale so as not to generate a peak by shaving the peak of electric energy consumption in a day having the highest peak of electric energy consumption by increasing the consumable amount of electric energy by the discharge run of the electric energy storage system and by the charge run in the other time zones.

To optimize ~~a~~ the contract electricity, the maximum electric energy consumption for at least ~~past~~ one past year was investigated. It is proper that the definition of the maximum electric energy consumption at this time is identified with that of the contract electricity. The maximum electric energy consumption is defined by an average electric energy consumption [kWh/h] for ~~a half~~one-half hour or one hour. In addition, an expected electric energy consumption after the system is set up is estimated in consideration of a plan for equipment in the establishment.

[0028] ~~On the other hand~~Therefore, an adequate scale of the electric energy storage system to be introduced is determined in consideration of a dischargeable amount of electric energy, a period of time for continuing discharge, and a dischargeable amount of electric energy in one running

operation from a specification of the electric energy storage system to be introduced.

For example, in the case of this tap water-supplying establishment, the highest peak of electric energy consumption in 1999 was present in a weekday in July, which was 1543 kW/h, and ~~a~~ the contract electricity of the last year was 1600 kW. In addition, there is no plan to sharply increase the water supply for a long period of time.

[0029] For example, in the case of using an electric energy storage system using ~~a~~ an NAS battery and capable of ~~a~~ an 8-hour discharge of rated electric energy for an amount of discharged electric energy and a rated 1.2-time discharge × 3 hours of excessive load discharge as a specification of the system, ~~a~~ the contract electricity ~~of 600kW~~ can be reduced by 600kW by introducing an electric energy storage system of rated 500kW × 7.2h. This is because a time of duration of the maximum electric energy consumption is short as a characteristic of a power load in this establishment. By running this system, ~~a~~ the contract electricity ~~of 600kW~~ can be reduced by 600kW even in the electric energy storage system of rated 500kW, and ~~a~~ the contract electricity can be changed to 1000kW even ~~in~~ on the day having the highest peak of electric energy consumption in the last year. Changes before and after the introduction of the electric energy storage system are shown in Table 4 and Fig. 1 on the basis of electric energy consumption ~~in~~ on the day having the highest peak of electric energy consumption in 1999.

[0030]

Table 4

[Running pattern of electric energy storage system on the day having the highest peak of electric energy consumption (unit: kWh/h)]
Electric energy storage system of 500kW × 7.2h

	Present state		After introduction of electric energy storage system				
	Purchased electricity	Unit fee for electricity	Discharged electricity	Charged electricity	Purchased electricity	Unit fee for electricity	
1 – 2 o'clock	560	10.35	0	440	1000	6.15	
2 – 3 o'clock	456	10.35	0	544	1000	6.15	
3 – 4 o'clock	352	10.35	0	648	1000	6.15	
4 – 5 o'clock	352	10.35	0	648	1000	6.15	
5 – 6 o'clock	352	10.35	0	648	1000	6.15	
6 – 7 o'clock	401	10.35	0	599	1000	6.15	
7 – 8 o'clock	972	10.35	0	28	1000	6.15	
8 – 9 o'clock	1325	10.35	325	0	1000	13.30	*1
9 – 10 o'clock	1543	10.35	543	0	1000	13.30	*1
10 – 11 o'clock	1264	10.35	264	0	1000	13.30	*1
11 – 12 o'clock	1033	10.35	33	0	1000	13.30	*1
12 – 13 o'clock	948	10.35	0	0	948	13.30	
13 – 14 o'clock	766	10.35	600	0	166	14.75	*2
14 – 15 o'clock	766	10.35	600	0	166	14.75	*2
15 – 16 o'clock	741	10.35	600	0	141	14.75	*2
16 – 17 o'clock	693	10.35	0	0	693	13.30	
17 – 18 o'clock	668	10.35	0	0	668	13.30	
18 – 19 o'clock	829	10.35	0	0	829	13.30	
19 – 20 o'clock	1014	10.35	14	0	1000	13.30	*1
20 – 21 o'clock	1119	10.35	119	0	1000	13.30	*1
21 – 22 o'clock	1163	10.35	163	0	1000	13.30	*1
22 – 23 o'clock	1063	10.35	63	0	1000	6.15	*1
23 – 24 o'clock	850	10.35	0	150	1000	6.15	
0 – 1 o'clock	623	10.35	0	377	1000	6.15	
Total [kWh]	19853		3323	4081	20611		
Electric energy consumption fee [×10,000 yen/day]		20.55				20.33	
Consumption rate			92.3				

*1: for peak shaving

*2: for reduction of daytime electric energy

Appendix B
VERSION WITH MARKINGS TO SHOW CHANGES MADE

[0031] In the case of using an electric energy storage system capable of ~~a~~ an 8-hour discharge of rated electric energy for an amount of discharged electric energy and a rated 2-time discharge × 3 hours of excessive load discharge as a specification of the system, ~~a~~ the contract electricity ~~of 600kW~~ can be reduced 600kW by introducing an electric energy storage system of rating 300kW × 7.2h. Changes before and after the introduction of the electric energy storage system are shown in Table 5 and Fig. 2 on the basis of electric energy consumption ~~in~~ on the day having the highest peak of electric energy consumption in 1999.

[0032]

Table 5

[Running pattern 2 of electric energy storage system on the day having the highest peak of electric energy consumption (unit: kWh/h)]

Electric energy storage system of 300kW × 7.2h

	Present state		After introduction of electric energy storage system			
	Purchased	Unit fee for	Discharged	Charged	Purchased	Unit fee for
1 – 2 o'clock	560	10.35	0	360	920	6.15
2 – 3 o'clock	456	10.35	0	360	816	6.15
3 – 4 o'clock	352	10.35	0	360	712	6.15
4 – 5 o'clock	352	10.35	0	360	712	6.15
5 – 6 o'clock	352	10.35	0	360	712	6.15
6 – 7 o'clock	401	10.35	0	360	761	6.15
7 – 8 o'clock	972	10.35	0	28	1000	6.15
8 – 9 o'clock	1325	10.35	325	0	1000	13.30
9 – 10 o'clock	1543	10.35	543	0	1000	13.30
10 – 11 o'clock	1264	10.35	264	0	1000	13.30
11 – 12 o'clock	1033	10.35	33	0	1000	13.30
12 – 13 o'clock	948	10.35	0	0	948	13.30
13 – 14 o'clock	766	10.35	150	0	616	14.75
14 – 15 o'clock	766	10.35	150	0	616	14.75
15 – 16 o'clock	741	10.35	150	0	591	14.75
16 – 17 o'clock	693	10.35	0	0	693	13.30
17 – 18 o'clock	668	10.35	0	0	668	13.30
18 – 19 o'clock	829	10.35	0	0	829	13.30
19 – 20 o'clock	1014	10.35	14	0	1000	13.30
20 – 21 o'clock	1119	10.35	119	0	1000	13.30
21 – 22 o'clock	1163	10.35	163	0	1000	13.30
22 – 23 o'clock	1063	10.35	63	0	1000	6.15
23 – 24 o'clock	850	10.35	0	0	850	6.15
0 – 1 o'clock	623	10.35	0	360	983	6.15
Total [kWh]	19853		1973	2548	20428	
Electric energy		20.55				20.38
Consumption			91.4			

Consumption rate 91.4%
(discharged electricity/ system capacity)

Effect per system scale
¥3,200/kW/month

Reduction of contract fee
600kW less ¥816,000/month

Electric energy consumption fee
(Average of a week)
Before introduction ¥205,500/day
After introduction ¥201,200/day
Example of Sunday ¥125,600/day
Reduction of fee ¥30,600/day

¥949,000/month

Appendix B

VERSION WITH MARKINGS TO SHOW CHANGES MADE

[0033] Further, in the case of introducing 600kW of an electric energy saving system having the same specification as the example of Table 4, electric energy charged in nighttime zones is insufficient and the electric energy storage system cannot be fully used even if ~~a~~ the contract electricity is reduced by 720 kW to make it to be 880 kW with a similar line of thinking as in Table 4. In the case of discharging electric energy for a discharge capacity of the electric energy storage system is discharged in daytime, electric energy charged in nighttime is short by about 2400 kWh. That is, an equipment capacity is excessive. Changes before and after the introduction of the electric energy storage system are shown in Table 6 on the basis of electric energy consumption ~~in~~ on the day of the highest peak of electric energy consumption in 1999.

[0034]

Table 6

[Running pattern 3 of electric energy storage system on the day having the highest peak of electric energy consumption (unit: kWh/h)]
Electric energy storage system of 600kW × 7.2h

	Present state		After introduction of electric energy storage system			
	Purchased electricity	Unit fee for electricity	Discharged electricity	Charged electricity	Purchased electricity	Unit fee for electricity
1 – 2 o'clock	560	10.35	0	320	880	6.15
2 – 3 o'clock	456	10.35	0	424	880	6.15
3 – 4 o'clock	352	10.35	0	528	880	6.15
4 – 5 o'clock	352	10.35	0	528	880	6.15
5 – 6 o'clock	352	10.35	0	528	880	6.15
6 – 7 o'clock	401	10.35	0	479	880	6.15
7 – 8 o'clock	972	10.35	92	0	880	6.15
8 – 9 o'clock	1325	10.35	445	0	880	13.30
9 – 10 o'clock	1543	10.35	663	0	880	13.30
10 – 11 o'clock	1264	10.35	384	0	880	13.30
11 – 12 o'clock	1033	10.35	153	0	880	13.30
12 – 13 o'clock	948	10.35	68	0	880	13.30
13 – 14 o'clock	766	10.35	480	0	286	14.75
14 – 15 o'clock	766	10.35	480	0	286	14.75
15 – 16 o'clock	741	10.35	480	0	261	14.75
16 – 17 o'clock	693	10.35	0	0	693	13.30
17 – 18 o'clock	668	10.35	0	0	668	13.30
18 – 19 o'clock	829	10.35	0	0	829	13.30
19 – 20 o'clock	1014	10.35	134	0	880	13.30
20 – 21 o'clock	1119	10.35	239	0	880	13.30
21 – 22 o'clock	1163	10.35	283	0	880	13.30
22 – 23 o'clock	1063	10.35	183	0	880	6.15
23 – 24 o'clock	850	10.35	0	30	880	6.15
0 – 1 o'clock	623	10.35	0	257	880	6.15
Total [kWh]	19853		4083	3093	18863	
Electric energy consumption fee [×10,000 yen/day]		20.55		↑ Shortage of charged electric energy by 2400kW		18.92
Consumption rate			94.5			

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[0035] Next, the second requisite to determine an adequate scale for an electric energy storage system to be introduced is that an electric energy consumption fee is reduced by applying fee system classified by seasons and time zones shown in Table 3 with increasing a rate of electric energy in a night time zone in the contract for a purchased amount of electric energy in the establishment by discharge running of the electric energy storage system in a daytime zone and charge running of the electric energy storage system in a nighttime zone.

[0036] The concept is described with referring to the electric energy storage system having a capacity of rated 500kW × 7.2 hours shown in Table 4.

In the example of the day having the highest peak of electric energy consumption in 1999, discharged electric energy for peak-shaving (from 8 to 12, and from 19 to 23 o'clock) to reduce ~~a~~ the contract electricity to 1000 kW is about 1500 kWh, which cannot make the most of storage capacity. Therefore, it is effective to discharge electric energy in time zones having the highest unit fee in case of employing a charge system classified by seasons and time zones to reduce purchased electricity. A scale is determined so that the peak of demand for electric energy ~~in~~ on the day having the highest peak of electric energy consumption in daytime is shaved by a discharge from the electric energy storage system and so that a peak is not generated due to increase in supply of electric energy charged in the other time zones.

[0037] On the other hand, an electric energy storage system on a holiday in July shows a running pattern with which a contract electricity of

1000kW is basically kept. This is because a nighttime fee is applied to all day long in a charge system classified by seasons and time zones as mentioned above. Therefore, the electric energy storage system is automatically run so that purchased electricity is controlled so as to correspond to an electric load above a contract electricity of 1000kW in time zones of 8 – 11 o'clock. An example of running the electric energy storage system is shown in Table 7 and Fig. 3.

[0038]

Table 7
[Running pattern of electric energy storage system on summer holiday (unit: kWh/h)]

	Present state		After introduction of electric energy storage system				
	Purchased electricity	Unit fee for electricity	Discharged electricity	Charged electricity	Purchased electricity	Unit fee for electricity	
1 – 2 o'clock	5236	10.35	0	477	1000	6.15	
2 – 3 o'clock	434	10.35	0	100	534	6.15	
3 – 4 o'clock	323	10.35	0	0	323	6.15	
4 – 5 o'clock	323	10.35	0	0	323	6.15	
5 – 6 o'clock	352	10.35	0	0	323	6.15	
6 – 7 o'clock	368	10.35	0	0	368	6.15	
7 – 8 o'clock	891	10.35	0	0	891	6.15	
8 – 9 o'clock	1214	10.35	214	0	1000	6.15	*1
9 – 10 o'clock	1415	10.35	415	0	1000	6.15	*1
10 – 11 o'clock	1158	10.35	158	0	1000	6.15	*1
11 – 12 o'clock	947	10.35	0	0	947	6.15	
12 – 13 o'clock	838	10.35	0	0	838	6.15	
13 – 14 o'clock	702	10.35	0	0	702	6.15	
14 – 15 o'clock	702	10.35	0	0	702	6.15	
15 – 16 o'clock	679	10.35	0	0	679	6.15	
16 – 17 o'clock	635	10.35	0	0	635	6.15	
17 – 18 o'clock	613	10.35	0	0	613	6.15	
18 – 19 o'clock	734	10.35	0	0	734	6.15	
19 – 20 o'clock	897	10.35	0	0	897	6.15	
20 – 21 o'clock	990	10.35	0	0	990	6.15	
21 – 22 o'clock	988	10.35	0	0	988	6.15	
22 – 23 o'clock	875	10.35	0	0	875	6.15	
23 – 24 o'clock	734	10.35	0	0	734	6.15	
0 – 1 o'clock	576	10.35	0	424	1000	6.15	
Total [kWh]	17881		787	1001	18905		
Electric energy consumption fee [×10,000 yen/day]		18.51				11.13	
Consumption rate			21.9				

*1: for peak shaving

[0039] Since electric energy consumption in the other seasons is less than in summer, it is almost impossible to make the most of a storage function of the electric energy storage system only by compensating the electric force above the contract electricity of 1000kW.

Therefore, it is preferable to reduce purchased electricity in daytime by employing a peak shaving running for maintaining purchased electricity of 1000kW in combination with previously programmed automatic running. An example of running pattern in weekday in May is shown in Table 8 and Fig. 4.

[0040]

Table 8
[Running pattern of electric energy storage system in weekday in other season (May) (unit: kWh/h)]

	Present state		After introduction of electric energy storage system				
	Purchased electricity	Unit fee for electricity	Discharged electricity	Charged electricity	Purchased electricity	Unit fee for electricity	
1 – 2 o'clock	482	9.40	0	518	1000	6.15	
2 – 3 o'clock	367	9.40	0	600	967	6.15	
3 – 4 o'clock	294	9.40	0	600	894	6.15	
4 – 5 o'clock	294	9.40	0	600	894	6.15	
5 – 6 o'clock	294	9.40	0	600	894	6.15	
6 – 7 o'clock	334	9.40	0	600	934	6.15	
7 – 8 o'clock	810	9.40	0	20	830	6.15	
8 – 9 o'clock	1104	9.40	104	0	1000	11.95	*1
9 – 10 o'clock	1286	9.40	300	0	986	11.95	*1
10 – 11 o'clock	1053	9.40	300	0	753	11.95	*1
11 – 12 o'clock	861	9.40	300	0	561	11.95	*2
12 – 13 o'clock	729	9.40	300	0	429	11.95	*2
13 – 14 o'clock	638	9.40	300	0	338	11.95	*2
14 – 15 o'clock	638	9.40	300	0	338	11.95	*2
15 – 16 o'clock	618	9.40	300	0	318	11.95	*2
16 – 17 o'clock	577	9.40	300	0	277	11.95	*2
17 – 18 o'clock	600	9.40	300	0	300	11.95	*2
18 – 19 o'clock	712	9.40	300	0	412	11.95	*2
19 – 20 o'clock	867	9.40	300	0	567	11.95	*2
20 – 21 o'clock	928	9.40	150	0	778	11.95	*2
21 – 22 o'clock	910	9.40	0	0	910	11.95	
22 – 23 o'clock	835	9.40	0	165	1000	6.15	
23 – 24 o'clock	671	9.40	0	329	1000	6.15	
0 – 1 o'clock	478	9.40	0	522	1000	6.15	
Total [kWh]	16379		3554	4554	17379		
Electric energy consumption fee [×10,000 yen/day]		15.40				15.31	
Consumption rate			98.7				

*1: for peak shaving
*2: for reduction of daytime electric energy

[0041] An example of running pattern in weekday in January is shown in Table 9 and Fig. 5 in a similar manner.

[0042]

Table 9

[Running pattern 2 of electric energy storage system in weekday in other season (May) (unit: kWh/h)]

	Present state		After introduction of electric energy storage system				
	Purchased electricity	Unit fee for electricity	Discharged electricity	Charged electricity	Purchased electricity	Unit fee for electricity	
1 – 2 o'clock	423	9.40	0	577	1000	6.15	
2 – 3 o'clock	325	9.40	0	600	925	6.15	
3 – 4 o'clock	250	9.40	0	600	850	6.15	
4 – 5 o'clock	225	9.40	0	600	825	6.15	
5 – 6 o'clock	235	9.40	0	600	835	6.15	
6 – 7 o'clock	300	9.40	0	400	700	6.15	
7 – 8 o'clock	650	9.40	0	0	650	6.15	
8 – 9 o'clock	1075	9.40	75	0	1000	11.95	*1
9 – 10 o'clock	1125	9.40	300	0	825	11.95	*1
10 – 11 o'clock	941	9.40	300	0	641	11.95	*2
11 – 12 o'clock	767	9.40	300	0	467	11.95	*2
12 – 13 o'clock	645	9.40	300	0	345	11.95	*2
13 – 14 o'clock	525	9.40	300	0	225	11.95	*2
14 – 15 o'clock	465	9.40	300	0	165	11.95	*2
15 – 16 o'clock	451	9.40	300	0	151	11.95	*2
16 – 17 o'clock	512	9.40	300	0	212	11.95	*2
17 – 18 o'clock	556	9.40	300	0	256	11.95	*2
18 – 19 o'clock	678	9.40	300	0	378	11.95	*2
19 – 20 o'clock	782	9.40	300	0	482	11.95	*2
20 – 21 o'clock	862	9.40	150	0	712	11.95	*2
21 – 22 o'clock	892	9.40	0	0	892	11.95	
22 – 23 o'clock	812	9.40	0	188	1000	6.15	
23 – 24 o'clock	590	9.40	0	410	1000	6.15	
0 – 1 o'clock	434	9.40	0	566	1000	6.15	
Total [kWh]	14520		3525	4541	15536		
Electric energy consumption fee [×10,000 yen/day]		13.65				13.47	
Consumption rate			97.9				

*1: for peak shaving

*2: for reduction of daytime electric energy

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[0043] In any of the examples, an electric energy consumption fee per day (weekday) was reduced after the electric energy storage system was introduced. In addition, since a nighttime fee is applied to Sundays, national holidays, and designated days during the end and the beginning of the year throughout the days in the charge system classified by seasons and time zones, an electric energy consumption fee is effectively reduced.

[0044] Next, an effect of introduction in the case of changing a consumption rate of an electric energy storage function of the same electric energy storage system is shown in the aforementioned Table 5 and Tables 10 and 11, and in Figs. 2, 9 and 10 using a contrast on the basis of Examples A – C. Example A shows an effect in the case that a system of 300kW × 7.2h was introduced and operated with a consumption rate of 91.4% in Table 5 and Fig. 2. Example B shows an effect in the case that the system was operated with a consumption rate of 63.1% in Table ~~5~~10 and Fig. ~~2~~9. Example C shows an effect in the case that the system was operated with a consumption rate of 45.4% in Table 11 and Fig. 10.

[0045]

Table 10

[Running pattern 2-2 of electric energy storage system on the day having the highest peak of electric energy consumption (unit: kWh/h)]

Electric energy storage system of 300kW × 7.2h

	Present state		After introduction of electric energy storage system			
	Purchased electricity	Unit fee for electricity	Discharged electricity	Charged electricity	Purchased electricity	Unit fee for electricity
1 – 2 o'clock	560	10.35	0	360	920	6.15
2 – 3 o'clock	456	10.35	0	360	816	6.15
3 – 4 o'clock	352	10.35	0	360	712	6.15
4 – 5 o'clock	352	10.35	0	18	370	6.15
5 – 6 o'clock	352	10.35	0	0	352	6.15
6 – 7 o'clock	401	10.35	0	0	401	6.15
7 – 8 o'clock	972	10.35	0	0	972	6.15
8 – 9 o'clock	1325	10.35	225	0	1100	13.30
9 – 10 o'clock	1543	10.35	443	0	1100	13.30
10 – 11 o'clock	1264	10.35	164	0	1100	13.30
11 – 12 o'clock	1033	10.35	0	0	1033	13.30
12 – 13 o'clock	948	10.35	0	0	948	13.30
13 – 14 o'clock	766	10.35	150	0	616	14.75
14 – 15 o'clock	766	10.35	150	0	616	14.75
15 – 16 o'clock	741	10.35	150	0	591	14.75
16 – 17 o'clock	693	10.35	0	0	693	13.30
17 – 18 o'clock	668	10.35	0	0	668	13.30
18 – 19 o'clock	829	10.35	0	0	829	13.30
19 – 20 o'clock	1014	10.35	0	0	1014	13.30
20 – 21 o'clock	1119	10.35	19	0	1100	13.30
21 – 22 o'clock	1163	10.35	63	0	1100	13.30
22 – 23 o'clock	1063	10.35	0	0	1100	6.15
23 – 24 o'clock	850	10.35	0	0	850	6.15
0 – 1 o'clock	623	10.35	0	360	983	6.15
Total [kWh]	19853		1364	1458	19985	
Electric energy consumption fee [×10,000 yen/day]		20.55				21.50
Consumption rate			63.1			

Consumption rate 63.1%
(discharged electricity/ system capacity)

Effect per system scale
¥2,600/kW/month

Reduction of contract fee
500kW less ¥680,000/month

Electric energy consumption fee
(Average of a week)
Before introduction ¥205,500/day
After introduction ¥201,800/day
Example of Sunday ¥122,900/day
Reduction of fee ¥25,600/day
¥793,000/month

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[0046]

Table 11

[Running pattern 2-3 of electric energy storage system on the day having the highest peak of electric energy consumption (unit: kWh/h)]

Electric energy storage system of 300kW × 7.2h

	Present state		After introduction of electric energy storage system			
	Purchased electricity	Unit fee for electricity	Discharged electricity	Charged electricity	Purchased electricity	Unit fee for Electricity
1 – 2 o'clock	560	10.35	0	360	920	6.15
2 – 3 o'clock	456	10.35	0	360	816	6.15
3 – 4 o'clock	352	10.35	0	360	712	6.15
4 – 5 o'clock	352	10.35	0	18	352	6.15
5 – 6 o'clock	352	10.35	0	0	352	6.15
6 – 7 o'clock	401	10.35	0	0	401	6.15
7 – 8 o'clock	972	10.35	0	0	972	6.15
8 – 9 o'clock	1325	10.35	125	0	1200	13.30
9 – 10 o'clock	1543	10.35	343	0	1200	13.30
10 – 11 o'clock	1264	10.35	64	0	1200	13.30
11 – 12 o'clock	1033	10.35	0	0	1033	13.30
12 – 13 o'clock	948	10.35	0	0	948	13.30
13 – 14 o'clock	766	10.35	150	0	616	14.75
14 – 15 o'clock	766	10.35	150	0	616	14.75
15 – 16 o'clock	741	10.35	150	0	591	14.75
16 – 17 o'clock	693	10.35	0	0	693	13.30
17 – 18 o'clock	668	10.35	0	0	668	13.30
18 – 19 o'clock	829	10.35	0	0	829	13.30
19 – 20 o'clock	1014	10.35	0	0	1014	13.30
20 – 21 o'clock	1119	10.35	0	0	1119	13.30
21 – 22 o'clock	1163	10.35	0	0	1163	13.30
22 – 23 o'clock	1063	10.35	0	0	1063	6.15
23 – 24 o'clock	850	10.35	0	0	850	6.15
0 – 1 o'clock	623	10.35	0	360	983	6.15
Total [kWh]	19853		982	1458	20312	
Electric energy consumption fee [× 10,000 yen/day]		20.55				21.97
Consumption rate			45.4			

Consumption rate 45.4%
(discharged electricity/ system capacity)

Effect per system scale
¥1,700/kW/month

Reduction of contract fee
400kW less ¥544,000/month

Electric energy consumption fee
(Average of a week)
Before introduction ¥205,500/day
After introduction ¥206,200/day
Example of Sunday ¥124,900/day
Reduction of fee ¥16,900/day
¥523,000/month

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[0047] It is known from the comparison among the aforementioned Examples A – C that a reduced amount of contract electric power is different and a reduced amount of electric energy consumption in daytime is different according to the consumption rate of an electric energy storage function, there is a large difference in introduction effect. Therefore, it shows effectiveness of a proposal of an effective operating method having high cost performance to an electric energy consumer.~~,~~

[0048] In addition, an operation effect in the case of conducting the same operation with a system scale of 600kW × 7.2h is shown in Table 12 and Fig. 11 as Example D. A contract amount is restricted by a necessary electric energy of nighttime charge if the system scale becomes large even if an electric energy load pattern of an electric energy consumer is the same. Therefore, it is found out that it shows low introduction effect in comparison with a system of 300kW × 7.2h in terms of a fee per system scale even if an apparent fee of an introduction effect is high.

[0049] Thus, it is very important to optimize a scale of a system according to a load pattern of an electric energy consumer.

[0050]

Table 12

[Running pattern 2-4 of electric energy storage system on the day having the highest peak of electric energy consumption (unit: kWh/h)]

Electric energy storage system of 600kW × 7.2h

	Present state		After introduction of electric energy storage system			
	Purchased electricity	Unit fee for electricity	Discharged electricity	Charged electricity	Purchased electricity	Unit fee for electricity
1 – 2 o'clock	560	10.35	0	340	900	6.15
2 – 3 o'clock	456	10.35	0	444	900	6.15
3 – 4 o'clock	352	10.35	0	548	900	6.15
4 – 5 o'clock	352	10.35	0	548	900	6.15
5 – 6 o'clock	352	10.35	0	548	900	6.15
6 – 7 o'clock	401	10.35	0	214	615	6.15
7 – 8 o'clock	972	10.35	72	0	900	6.15
8 – 9 o'clock	1325	10.35	425	0	900	13.30
9 – 10 o'clock	1543	10.35	643	0	900	13.30
10 – 11 o'clock	1264	10.35	364	0	900	13.30
11 – 12 o'clock	1033	10.35	133	0	900	13.30
12 – 13 o'clock	948	10.35	48	0	900	13.30
13 – 14 o'clock	766	10.35	0	0	766	14.75
14 – 15 o'clock	766	10.35	0	0	766	14.75
15 – 16 o'clock	741	10.35	0	0	741	14.75
16 – 17 o'clock	693	10.35	0	0	693	13.30
17 – 18 o'clock	668	10.35	0	0	668	13.30
18 – 19 o'clock	829	10.35	0	0	829	13.30
19 – 20 o'clock	1014	10.35	114	0	900	13.30
20 – 21 o'clock	1119	10.35	219	0	900	13.30
21 – 22 o'clock	1163	10.35	263	0	900	13.30
22 – 23 o'clock	1063	10.35	163	0	900	6.15
23 – 24 o'clock	850	10.35	0	0	900	6.15
0 – 1 o'clock	623	10.35	0	277	900	6.15
Total [kWh]	19853		2443	2919	20378	
Electric energy consumption fee [×10,000 yen/day]		20.55				21.20
Consumption rate			113.1			

Consumption rate 56.6%
(discharged electricity/
system capacity)

Reduction of contract fee
700kW less ¥952,000/month

Electric energy consumption fee
(Average of a week)
Before introduction ¥205,500/day
After introduction ¥199,600/day
Example of Sunday ¥125,300/day
Reduction of fee ¥36,600/day
¥1,134,000/month

Effect per system scale
¥1,900/kW/month

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[0051] These concepts can be summarized as follows:

The following conditions are necessary for the electric energy storage system to exhibit the effect of reducing an electric fee and to maximize the effect of the introduction thereof.

[0052] 1) To research into conditions of electric energy consumption (purchased amount of electric energy) by the electric energy consumer for a predetermined period, e.g. at least ~~past~~ one past year, so as to be used as base data for determining a scale of the electric energy storage system to be introduced or a running pattern after the introduction.

[0053] 2) To research into an electric fee system which is arranged by an electric energy supplier and which the electric energy consumer can use and investigate an effect on an electric fee by load-leveling to select the optimum electric fee system.

[0054] 3) To determine a scale of the electric energy storage system to be introduced on the basis of a date set for a contract electricity before the electric energy storage system is introduced, conditions of electric energy consumption on the day having the peak of the maximum load, a day having the highest peak of electric energy consumption, and a specification of the electric energy storage system expected to be introduced. To optimize a scale of the system to be introduced, not only an amount to be reduced of a contract electricity, but also a consumption rate of an electric energy storage function is investigated so as not to give an excessive capacity of equipment.

In this case, a consumption rate of electric energy storage function in the electric energy storage system is preferably 80% or more, and more

preferably 90% or more.

[0055] 4) To determine a running program for discharging the electric energy storage system in a time zone for high consumption of electric energy and for a high unit fee for consumed electric energy so as to reduce a purchased amount of electric energy and for charging the electric energy storage system in a time zone for a low unit fee for consumed electric energy. The running program is planned according to the past records of electric energy consumption. When an electric charge system to be applied after the introduction is classified by seasons and time zones, a plurality of running programs are preferably planned according to the electric charge system.

[0056] For example, for the tap water-supplying establishment shown in Table 2, the following three kinds of running patterns are planned because a charge system classified by seasons and time zones can be applied by introducing an electric energy storage system.

1. Weekday in summer:
   - demand-control running for purchased electricity above ~~a~~ the contract electricity and planned discharge in the peak time zone.
   - charge in nighttime zone.
2. Weekday in the other season
   - demand control running for purchased electricity above ~~a~~ the contract electricity and planned discharge in daytime zones.
3. Sunday, national holiday, or the like
   - demand control running for purchased electricity above ~~a~~ the contract electricity.

This enables ~~to run~~ the electric energy storage system to be run with making the most of its storage capacity through a year.

Since these running patterns change depending on a power load of an electric energy consumer, a running ~~patter~~ pattern and the number of patterns are various depending on an electric energy consumer.

[0057] 5) A running program determined by these investigations is preferably memorized by a control device for an electric energy storage system in advance. That is, it is possible and preferable to previously input a running pattern to a computer-control means according to designation on days fixed in a electric fee system, days treated as national holidays, etc., to run the electric energy storage system. In addition, conditions and a calendar are changed in every fiscal year for an electric fee ~~contraction~~contract. Therefore, contents of change in an electric fee system and a calendar are regularly checked at the end of a fiscal year, and it is necessary to change a running program ~~with~~ based on conditions of purchased electricity in the preceding year. It is preferable that these running programs can be changed by a person controlling the operation or a third person with a communication circuit, or the like with a knowledge of electric fee systems and an accurate grasp of power load conditions for optimum operation of an electric energy storage system.~~, because this is a very~~ This is a more effective ~~mean in view~~means of providing concentrated control in the case ~~that~~ where electric energy storage systems are introduced into a plurality of facilities~~since a knowledge of an electric fee system and an accurate grasp of power load conditions for optimum operation of an electric energy storage system~~.

[0058] 6) ~~There sometimes cause~~Occasionally, an unexpected situation for an estimated electric energy consumption at an electric energy consumer arises even if a running pattern is determined ~~with a~~based on a previously estimated power load~~ being estimated previously~~. It is necessary to frame a control algorithm where priority is given to the maintenance of a contract electricity.

[0059] 7) It is preferable that a third person observes a power load and controls the electric energy storage system according to the load on the supposition that an unexpected power load conditions are caused at an electric energy consumer. That is, it becomes possible to intend to avoid loading in an emergency. For example, the electric energy storage system is introduced in a plurality of facilities in one establishment, concentrated control in one place enables more optimum operation.

[0060] As described above, according to the present invention, there is provided a method for running an electric energy storage system capable of minimizing a total electric fee with respect to an electric fee by an electric power company and an electric fee by the electric energy storage system in setting up an electric energy storage system at the electric energy consumer and in running the electric energy storage system.